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AUTHOR Denton, Jon J.; Tooke, D. James
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ABSTRACT

Two questions were addressed in this study: (1) Is learner cognitive attainment stable across different instructional units taught by a student teacher? and (2) Do the pupils of student teachers who are education majors attain more cognitive performance objectives than the pupils of student teachers who are not education majors? Secondary level student teachers and their classes were studied for five semesters. The most significant data were obtained from the validated criterion-referenced tests developed by the student teachers. It was found that an individual objective set by the student teacher was achieved by a mean of 67 percent of the pupils. The percentage of objectives obtained was used as the dependent variable to answer the second question. The findings suggest that the differences in learner cognitive attainment of student teachers is positively influenced by the amount of professional education coursework completed by the teaching candidates. These findings support the use of consequence criteria in evaluating student teachers and the assumption that professional education coursework has a positive influence. (FG)

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Assessing Student Teacher Performance on the Basis of Cognitive Attainment of Their Learners

by
Jon J. Denton
Professor

D. James Tooke
Lecturer

Instructional Research Laboratory
Educational Curriculum & Instruction
College of Education, Texas A&M University

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Problem

The press for accountability is no longer reserved for public schools. Teacher preparation programs are currently being examined critically by legislative committees, interested publics and professional educators with respect to their quality control procedures. Responding to these demands, a research effort has been initiated to examine all phases of the secondary level teacher preparation program in Educational Curriculum and Instruction at Texas A&M University. Specifically, this effort was undertaken to determine whether teaching candidate effectiveness could feasibly be related to the cognitive attainment levels of learners taught by student teachers. Research questions phrased for this effort include:

1. Is learner cognitive attainment stable across different instructional units taught by a student teacher?

2. Do learners of student teachers who are education majors attain more cognitive performance objectives than learners of student teachers who are non-education majors?

Perspectives

A precedent for using learner cognitive attainment as a measure of teaching success dates back to the scientific management era in American schools from 1910 to 1930 (Callahan, 1962). Apparently, this interest continued for some time given the investigations by Rostker (1945), Rolfe (1945), and LaDuke (1945). These investigators collected multiple teacher and learner variables while examining teaching ability based on learner achievement. Interestingly, these investigators employed rather elaborate statistical procedures, i.e., multiple regression, to explain the effects of teacher variables on learner achievement.

During the past decade or so, assessment issues in teacher education have received substantial attention, due in part to attempts to plan, develop, and implement competency based teacher education (CBTE) programs. Two major positions

emanating from CBTE regarding assessment of teacher competency are: (1) procedures on the one hand which assess the process and practice of teaching candidates and (2) assessment techniques which encourage the collection of learner attainment information (consequence criteria) on the other (Weber, 1974).

Proponents of the process approach cite measurement problems, and economic considerations associated with obtaining learner achievement gains from standardized tests as major deterrents in using consequence criteria for assessing preservice teacher competence (Glass, 1974; Soar, 1973). Medley (1978) cites a number of alternative strategies for assessing teaching candidates, e.g., teaching tests, behavior samples, teaching exercises, classroom interaction simulations, projected problem exercises, which with the exception of the teaching tests are categorized among the process criteria approaches for candidate assessment. Interestingly the emphasis on process criteria tends to dominate the professional literature concerned with assessing the competence of preservice teachers (Kay, 1978; Pottinger, 1978; Tikunoff & Ward, 1978). Thus, teacher educators who have labored with the issues of assessing teaching competence in terms of consequence criteria (learner attainment) have encountered resistance because this approach, it is said, places the fate of the teaching candidate in the hands of their learners. Proponents of consequence criteria on the other hand indicate that process criteria alone simply do not yield adequate evidence that candidates have necessary teaching skills to succeed in the classroom (Brinkerhoff, 1978; Denton & Norris, 1979; Denton & Norris, 1981; Denton, Morris, 1980).

Perhaps an approach which integrates learner cognitive attainment data with systematic classroom observations is the optimal assessment strategy for the preparation of teachers. McNeil and Popham (1973, pp. 233-234) have derived such a strategy which involves contract plans based on learner cognitive gain. With little or no modification, this contract plan can serve as a strategy for assessing a student teacher's competence. This approach is based on the notion that the

objectives of the curricular plan must be agreed on before teacher competency can be assessed. Supervisors and the teaching candicate must agree on the appropriateness of stated performance objectives for the learners. Further, agreement is reached before instruction begins regarding what evidence will be used to determine whether the teaching has resulted in learner attainment of the performance objectives. Data are subsequently collected to determine whether learners have achieved the stated objectives as well as whether unintended outcomes have emerged.

Procedures

Data were collected over five semesters (Spring 1978 - Spring 1980) from secondary level student teachers and learners taught by these teaching candidates. The teacher preparation program these candidates completed is a competency based program for secondary level teachers fashioned around a diagnostic-prescriptive model of instruction. (Armstrong, Denton, Savage, 1978).

Some time ago a multi-stage evaluation system was established to monitor the development and implementation of this competency based program (Denton, 1977). Data gathered through this ongoing evaluation have formed the data base for this investigation. A variety of scales and criterion-referenced instruments were used to yield information in this effort. Perhaps the most significant information collected among all data was achievement information (learner attainment of individual unit objectives, pretest scores, and unit posttest scores). Criterion-referenced tests developed by the student teacher were used to provide these achievement data. Although measurement difficulties are inherent with these tests, validity checks on each test were made by the classroom and university supervisor before the instruments were administered. Once these data were collected, examination of the learner cognitive attainment summaries were compared with the student teacher's instructional units. Discrepancies between the summaries and the unit plans were

noted in terms of the number and cognitive level of the objectives in each. Subsequent to this assessment data from eight student teachers and their classes were deleted resulting in a sample of 82 student teachers and cognitive attainment summaries from 9001 learners. Unfortunately, incomplete data resulted in the deletion of four additional data sets producing a final sample of 78 student teachers for the analyses of research question 2.

Analysis and Findings

Descriptive analysis of data from the above sources reveals that seventy percent of the student teachers devised instructional units consisting of six performance objectives. Moreover, attainment of objectives by learners of the student teachers' was observed to be very stable across objectives ranging from a high of 72% to a low of 63% attainment. In other words, an individual objective was achieved by 67 ± 5% of the learners. These data are summarized in table I.

Table I
Learner Performance on Individual Unit Objectives

	Unit 1		Unit 2	
Objective	$\bar{X}$	S.D.	$\bar{X}$	S.D.
1	.70	.46	.70	.46
2	.72	.45	.67	.47
3	.68	.47	.68	.46
4	.69	.47	.65	.48
5	.69	.46	.63	.48
6	.66	.47	.64	.49

When these data were examined in terms of learner performance over all unit objectives, we found the average number of objectives attained was 4 (67%) by a learner on each of the instructional units. This common value occurred despite the fact that the distributions of learner attainment for the two units were not identical. These distributions are illustrated in figure 1.

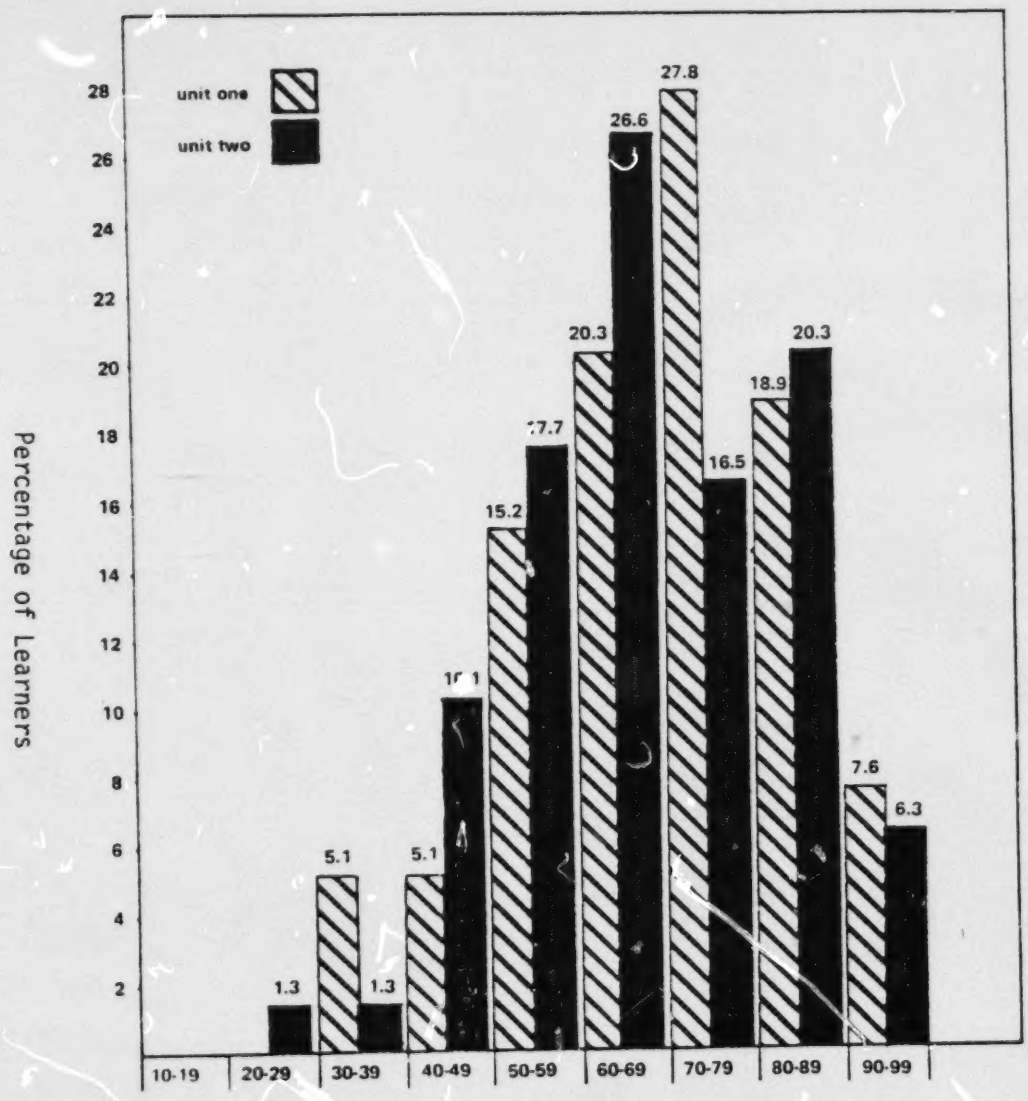

Figure 1
Histograms of Percentage of Unit Objectives Attained by Learners

A straightforward linear model of the form, $y = b_i X_i + E$, was developed to answer the second research question. The dependent variable (y) is the percentage of objectives attained in the instructional unit. The predictor variables designated as (X_i) are classificatory in nature indicating whether the teaching candidate is an education major. The remaining term (E) is the error which represents the variance not accounted for by the model.

This regression model was analyzed and a test of significance was performed on the percentage of objectives attained by learners in each instructional unit. Since the unit of analysis for this procedure is the student teacher, learner data are summarized as mean values per student teacher. The resulting analysis indicates the model does not account for sufficient variance to be statistically significant for learner performance in unit one, F = 1.05, yet does account for 4.6% of the varience in unit two with a corresponding F value, F = 3.62. These analysis are summarized in table II.

Table II

Summary of Analyses For Research Question 2

Instructional Unit		$\bar{X}$	S.D.	ANOVA	DF	MS	F	R^2
1	majors	68.02	18.55	Predictor	1	375.4	1.05	.014
	non-majors	66.00	19.63	Error	76	357.8		
		$\bar{X}$	S.D	ANOVA	DF	MS	F	R^2
2	majors	69.62	15.28	Predictor	1	824.5	3.62	.046
	non-majors	62.96	14.74	Error	76	227.5		

These findings suggest differences in learner cognitive attainment of student teachers is positively influenced by the amount of professional education coursework completed by the teaching candidate.

Discussion

The findings related to research question one regarding the stability of learner cognitive attainment across instructional units is encouraging to proponents of

consequence criteria being incorporated in the evaluation of student teachers (Brinkerhoff, 1978, Denton & Norris, 1979, Denton & Norris, 1981). Perhaps the finding that two-thirds of the learners will achieve a particular objective, and the additional finding that when examined collectively, two-thirds of all objectives in a unit will be attained can serve as baseline values for assessing the competence of individual student teachers.

Findings related to research question two suggest that variation in learner cognitive attainment does occur among student teachers, and further, that some of this variation is related to the professional preparation of the teaching candidates. At first glance, these findings tend to be in conflict, since the findings for research question 1 indicate a clustering of cognitive attainment values by learners, while the values reported for question two, reveal differences do occur across student teachers. Yet when the unit of analysis for these findings are recalled, the apparent conflict is resolved. In the case of research question one, learner cognitive attainment is examined with respect to individual learners, in other words, the learner is the unit of analysis; while for the second finding, data are organized with respect to the student teacher, where the student teacher is the unit of analysis. Thus, there is evidence of learner cognitive attainment clustering when the data are examined with respect to individual learners; yet when the data are averaged across all learners assigned to a student teacher we find the clusters do vary. This observation is certainly not surprising but it does reinforce our position that consequence criteria in student teaching does deserve serious consideration. Further, the second result regarding cognitive differences among learners based on the major of the student teacher is significant and much needed for defending present preparation programs of teachers. This finding leads empirical support to the assumption that professional education coursework does influence, positively, the candidates' ability to design, implement, manage, and discuss an instructional system.

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